REMARKS

Claim 3 has been canceled. Claims 1, 4, 5, and 18 have been amended. Claims 1, 2, and 4 through 19 remain in the application.

Claims 1 through 19 were rejected under 35 U.S.C. § 102(b) as being anticipated by Huston (U.S. Patent No. 6,146,143). Applicants respectively traverse this rejection.

U.S. Patent No. 6,146,143 to Huston discloses a dynamically controlled vehicle simulation system and methods of constructing and utilizing same. A system which simulates the operation of a vehicle includes a computing means 1, driving station 2, input devices 3, audio speakers 5 and video means 6 for displaying a sequence of visual images as controlled by computing means 1. Driving station 2 includes a driver's seat, a dashboard having gauges and other instrumentation, and control devices 8 which simulate the controls of the vehicle being simulated. Each input device 8 is preferably electrically connected to computing means 1 so that computing means 1 monitors the control and/or manipulation of control devices 8 by the system user for use in simulating the operation of the simulated vehicle. In one embodiment in which a land-based vehicle is simulated, control devices 8 preferably include steering wheel 21, accelerator 22, brake 23, clutch 24, gear shift 25, turn signal 26, windshield wiper control mechanism 27 and mirror control mechanism 28, as shown in FIG. 3. Computing means 1 preferably includes a database 11 (FIG. 2) of a simulated environment stored in memory. The simulated environment preferably includes data representing a roadway network and terrain bordering the roadway network. Database 11 is accessed by program software 10. The simulated roadway network in database 11 is partitioned into highways, rural roads, and city streets, having features conventionally associated with each such roadway so the system accurately simulates traveling thereon by the simulated vehicle. The system includes a means for modeling the dynamics of the simulated vehicle as the simulated vehicle travels along the simulated roadway.

The dynamics modeling means comprises code in program software 10 which utilizes a coefficient of friction of the simulated roadway and rolling resistance of the tires of the simulated vehicle in simulating the dynamic response of the simulated vehicle. Huston does not disclose a computer generated digital model of a vehicle mechanism stored in memory of a computer system having at least one control handle and a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the computer generated digital model, and the computer system. Huston also does not disclose the haptic interface including a haptic end effector device being grasped by the user for transmitting information between a user and the digital model, wherein the user interactively creates, modifies, and evaluates kinematic and dynamic properties of the vehicle mechanism using the haptic end effector device and the at least one control handle.

Independent claim 1, as amended, clarifies the invention claimed as a system for virtual interactive design and evaluation and manipulation of vehicle mechanisms including a computer system. The computer system includes a memory, a processor, a user input device and a display device. The system also includes a computer generated digital model of a vehicle mechanism stored in the memory of the computer system and having at least one control handle. The system further includes a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the computer generated digital model, and the computer system. The haptic interface includes a haptic end effector device being grasped by the user for transmitting information between a user and the digital model. The user interactively creates, modifies, and evaluates kinematic and dynamic properties of the vehicle mechanism using the haptic end effector device and the at least one control handle.

A rejection grounded on anticipation under 35 U.S.C. § 102 is proper only where the subject matter claimed is identically disclosed or described in a reference. In other words,

anticipation requires the presence of a single prior art reference which discloses each and every element of the claimed invention arranged as in the claim. In re Arkley, 455 F.2d 586, 172 U.S.P.Q. 524 (C.C.P.A. 1972); Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983); Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 U.S.P.Q. 481 (Fed. Cir. 1984).

Huston '143 does not disclose or anticipate the claimed invention of claim 1. Specifically, Huston '143 merely discloses a dynamically controlled vehicle simulation system and methods of constructing and utilizing same in which a system simulates the operation of a vehicle includes a computing means, driving station, input devices, audio speakers, and video means for displaying a sequence of visual images as controlled by computing means. Huston '143 lacks a computer generated digital model of a vehicle mechanism stored in memory of a computer system having at least one control handle and a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the computer generated digital model, and the computer system. In Huston '143, control devices 8 simulate the controls of the vehicle and are electrically connected to computing means 1 so that computing means 1 monitors the control and/or manipulation of control devices 8 by the system user for use in simulating the operation of the simulated vehicle, but the control devices 8 are not a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the computer generated digital model, and the computer system. As such, Huston '143 does not have a haptic end effector device expressly or inherently disclosed.

Huston '143 also lacks the haptic interface including a haptic end effector device being grasped by the user for transmitting information between the user and the digital model, wherein the user interactively creates, modifies, and evaluates kinematic and dynamic properties of the vehicle mechanism using the haptic end effector device and the at least one control handle.

In Huston '143, a database 11 (FIG. 2) of a simulated environment includes data representing a roadway network and terrain bordering the roadway network, but does not have a digital model of a vehicle mechanism having at least one control handle wherein the user interactively creates, modifies, and evaluates kinematic and dynamic properties of the vehicle mechanism using the haptic end effector device and the at least one control handle. Huston '143 does not have any control handles on a digital model.

Huston '143 fails to disclose the combination of a system for virtual interactive design and evaluation and manipulation of vehicle mechanisms including a computer system having a memory, a processor, a user input device and a display device, a computer generated digital model of a vehicle mechanism stored in the memory of the computer system and having at least one control handle, and a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the computer generated digital model, and the computer system with the haptic interface including a haptic end effector device being grasped by the user for transmitting information between a user and the digital mode, wherein the user interactively creates, modifies, and evaluates kinematic and dynamic properties of the vehicle mechanism using the haptic end effector device and the at least one control handle as claimed by Applicants. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 102(b).

As to independent claim 5, claim 5, as amended, clarifies the invention claimed as a method for virtual interactive design and evaluation and manipulation of vehicle mechanisms using a haptic-user interface. The method includes the steps of importing a digital model of a vehicle mechanism for evaluation using a haptic end effector device operatively connected to a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the digital model, and a computer system, and determining whether a user is

signaling a mode change for the digital model. The method also includes the steps of determining the mode change if the user is signaling a mode change of the digital model and getting a position of the haptic end effector device into a coordinate reference frame for the digital model if the user is not signaling a mode change of the digital model. The method further includes the steps of determining whether a control handle on the digital model is close enough to the haptic end effector device, executing the mode change if the control handle is close enough, applying an attraction force to the control handle if the control handle is close enough, determining whether the user is terminating the session, and terminating the session if the user is terminating the session. Independent claim 18 has been amended similar to claim 5 and includes other features of the present invention.

Huston '143 does not disclose or anticipate the claimed invention of claims 5 through 19. Specifically, Huston '143 merely discloses a dynamically controlled vehicle simulation system and methods of constructing and utilizing same in which a system simulates the operation of a vehicle includes a computing means, driving station, input devices, audio speakers, and video means for displaying a sequence of visual images as controlled by computing means. Huston '143 lacks importing a digital model of a vehicle mechanism for evaluation using a haptic end effector device operatively connected to a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the digital model, and a computer system. In Huston '143, control devices 8 simulate the controls of the vehicle and are electrically connected to computing means 1 so that computing means 1 monitors the control and/or manipulation of control devices 8 by the system user for use in simulating the operation of the simulated vehicle, but the control devices 8 are not a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the

computer generated digital model, and the computer system. As such, Huston '143 does not have a haptic end effector device expressly or inherently disclosed.

Huston '143 also lacks determining whether a control handle on the digital model is close enough to the haptic end effector device, executing a mode change if the control handle is close enough, and applying an attraction force to the control handle if the control handle is close enough. In Huston '143, a database 11 (FIG. 2) of a simulated environment includes data representing a roadway network and terrain bordering the roadway network, but does not have a control handle on the digital model of a vehicle mechanism or applying an attraction force to the control handle. Huston '143 does not have any control handles on a digital model.

Huston '143 fails to disclose the combination of a method for virtual interactive design and evaluation and manipulation of vehicle mechanisms using a haptic-user interface including the steps of importing a digital model of a vehicle mechanism for evaluation using a haptic end effector device operatively connected to a haptic-user interface operated by a user that controls position, orientation, and force feedback between the user, the digital model, and a computer system, determining whether a user is signaling a mode change for the digital model, determining the mode change if the user is signaling a mode change of the digital model, getting a position of the haptic end effector device into a coordinate reference frame for the digital model if the user is not signaling a mode change of the digital model, determining whether a control handle on the digital model is close enough to the haptic end effector device, executing the mode change if the control handle is close enough, applying an attraction force to the control handle if the control handle is close enough, determining whether the user is terminating the session, and terminating the session if the user is terminating the session as claimed by Applicants. Therefore, it is respectfully submitted that claims 5 through 19 are allowable over the rejection under 35 U.S.C. § 102(b).

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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